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**M226 Engine control
Software v1.1
Rev 1.00**

MICROTEC S.R.L.

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Overview

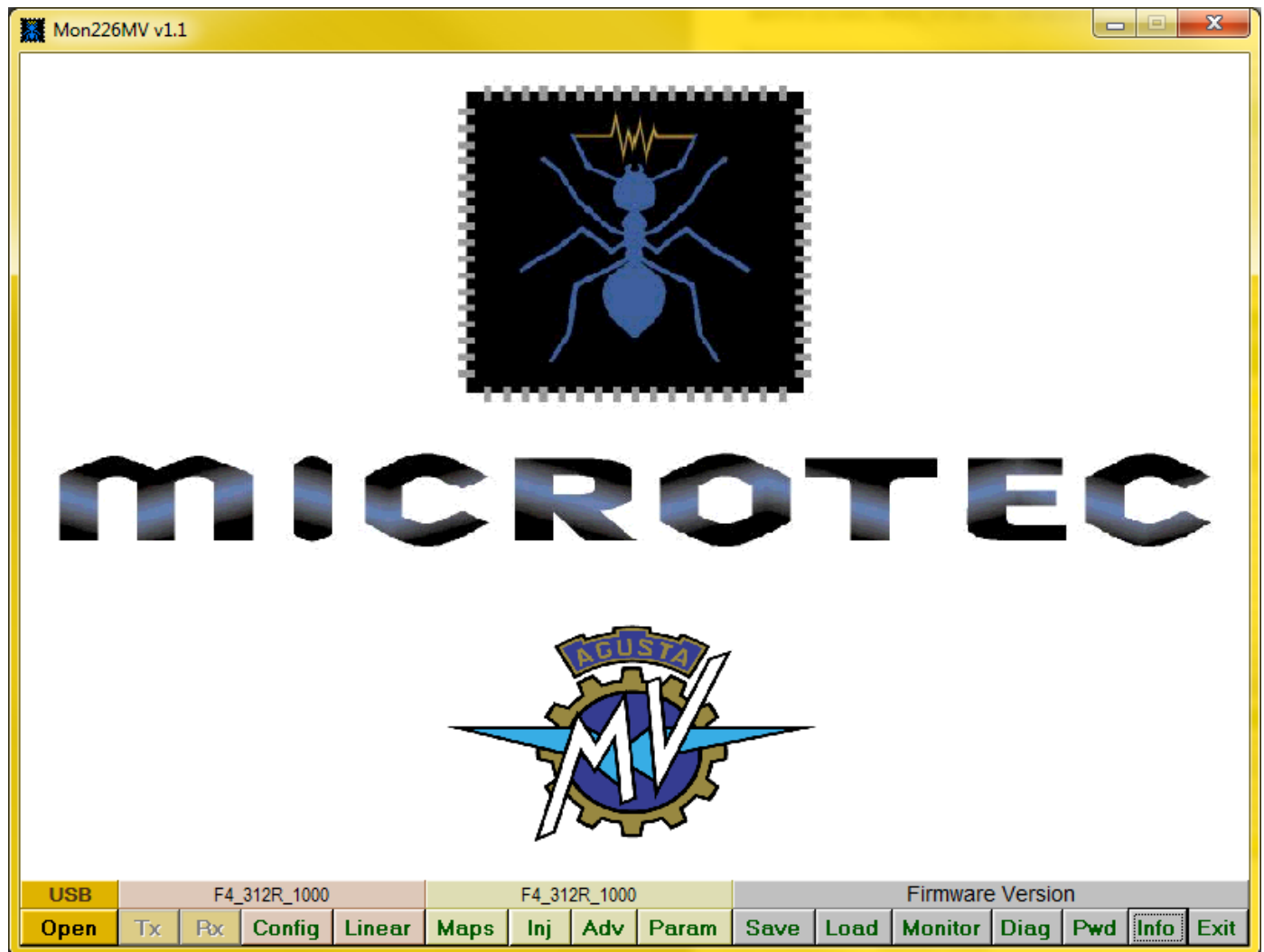
The M226 is a plug&play unit for MV F4 (until MY09) and Brutale (all MY) bikes.

It implements all the functions and security strategies given by the original one and is supplied with the original maps, completely configurable.

Basic functions are:

- 2 input for pick up, 1 inductive and 1 hall.
- 4 output high side (triggers for coil)
- 4 command for injectors
- Analog inputs
- Digital inputs
- Digital outputs
- PWM control

Everything is programmed via CAN line at high speed using the M196 product (9.001.196.01021) distributed by Microtec s.r.l.



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After installation, your software should look like this, with the **Configuration / General** page showing as default and empty settings in all environments.

The Mon226 software splits the ECU settings into 2 distinct areas.

- **Configuration** – Any parameter that relates to the application of the ECU to the installation.
- **Map** – Any parameter that could be considered as an 'engine tuning' setting.

If your system has been pre-designed or you have been given some base settings to work with, you can load them now using the LOAD buttons at the bottom of this page.

Mon226MV v1.1

Configuration (general)

Engine

Type: F4 (Hall Cam)

Coupling Angle [deg]: 450.0

Scam Inhibition Limit [RPM]: 15000

Pneumatic Cam

	Lower	Upper
Speed Thresholds [RPM]	1	256
Throttle Thresholds	76.8	76.8
Teeth Interval	21	21
Minimum Pressure Variation [A/D]	0	
Phased-Like Injection	ON	Ratio 0.200

Signals

Shift	HIGH
Stop	LOW
DropSwitch	LOW

PWM Frequencies [Hz]

Exhaust Valve	20000
EBS Valve	200
TSS Valve	200

CAN channel IDs [hex]

Lambda Module	300
Auxiliary Keypad	7FF

Miscellaneous

Tacho Pulses per Revolution	2
Stop Delay [ms]	50
Velocity Reference	Rear Wheel
Gear-Shift Mode	Standard
Traction C. Manual Adjust	Auxiliary
Immobilizer Function	Disabled
Dashboard Warning	Disabled

Exhaust Valve Control

Motor Range [AD]	Kp	0.80	
0%	710	Ki	0.0015
100%	440	Tolerance	4

Injection Battery Offset

[Volt]	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	14.0	15.0	16.0
[ms]	2.500	2.150	1.700	0.868	0.740	0.640	0.564	0.480	0.380	0.300	0.150	0.100	0.050	0.000	0.000	0.000

Dwell

[Volt]	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	14.0	15.0	16.0
[ms]	6.300	6.300	6.300	4.700	3.600	3.000	2.650	2.400	2.200	1.980	1.900	1.780	1.670	1.500	1.350	1.250

Pick-Up Table

RPM	900	1150	1800	2700	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500
[deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes

Config base F4 312R 1000

USB: F4_312R_1000

Firmware Version

Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

Save / Load / Transmit

Any changes that are made to software parameters must be saved and then transmitted (uploaded) to the ECU for them to take affect.

Open

Tx Rx Sync Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

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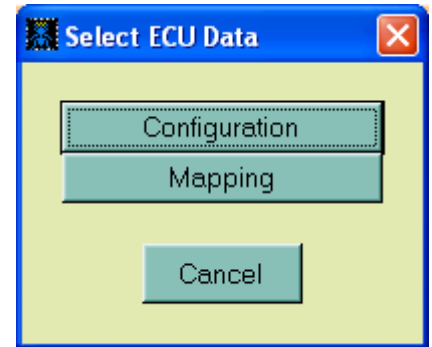


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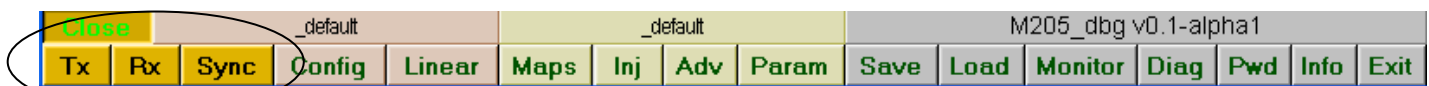
Save - Use the Save button on the tool bar to save any changes you have made, you will be given the choice to save either the Configuration or the Map file, if you have made changes to both of these zones you will need to make the Save file to both the configuration file (*.ecd) and the Map file (*.emd)

Your choice of file name is completely free.

You will also notice that the file names shown above the button bar will change to match your naming choice. These are the file names in use on your PC, NOT the ones currently loaded in the ECU.



Load - Use the Load button to choose a previously stored Configuration or Map file. After pressing you are again given the choice to load either the Config or Map as shown above.

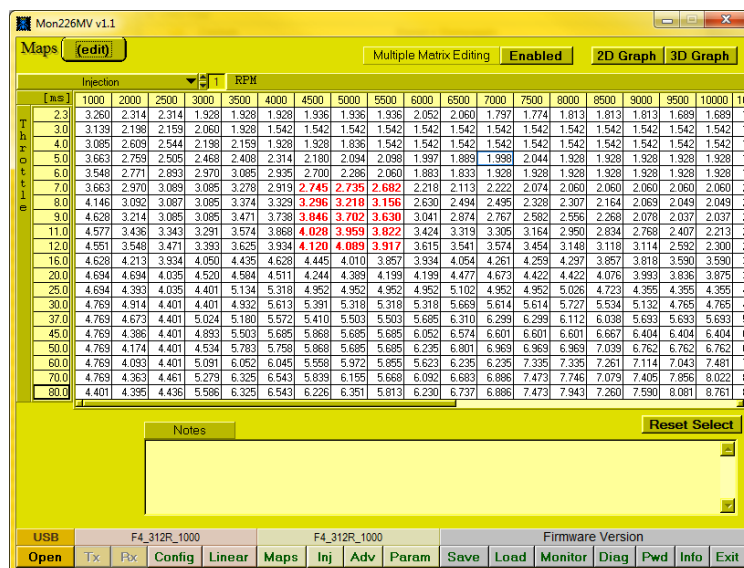
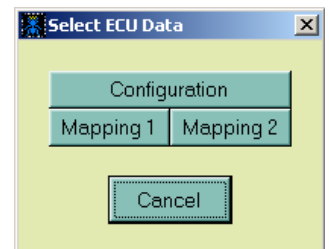
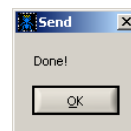


Transmit - To transmit (upload) a file from your PC to the ECU you must first establish a link by pressing the Open button, if the link is established correctly the TX and RX button will become active as shown here.

To send either a Configuration or a Map to the ECU press the **TX** button, the following window will open.

By pressing the **Configuration** button you will send the complete Configuration file to the ECU.

By pressing **Mapping 1** or **Mapping 2** you can send your complete map



into either Map position 1 or Map position 2. In this way you can have 2 completely different maps that are instantly switchable by the rider/driver. When it is completed you will receive the OK confirmation window.

Any differences between the original PC map and the Map taken from the ECU will be shown in Bold Red text as in this example.

These values will remain in Red until you make a Save of the map.

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The **config** page can be found by pressing this button



Mon226MV v1.1

Configuration (general)

Engine

Type:

Coupling Angle [deg]:

Scam Inhibition Limit [RPM]:

Pneumatic Cam

	Lower	Upper
Speed Thresholds [RPM]	1	256
Throttle Thresholds	76.8	76.8
Teeth Interval	21	21
Minimum Pressure Variation [A/D]	0	
Phased-Like Injection	ON	Ratio 0.200

Signals

Shift:

Stop:

DropSwitch:

PWM Frequencies [Hz]

Exhaust Valve:

EBS Valve:

TSS Valve:

CAN channel IDs [hex]

Lambda Module:

Auxiliary Keypad:

Miscellaneous

Tacho Pulses per Revolution:

Stop Delay [ms]:

Velocity Reference:

Gear-Shift Mode:

Traction C. Manual Adjust:

Immobilizer Function:

Dashboard Warning:

Exhaust Valve Control

Motor Range [AD]	Kp	Ki	Tolerance
0%: 710	0.80	0.0015	4
100%: 440			

Injection Battery Offset

[Volt]	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	14.0	15.0	16.0
[ms]	2.500	2.150	1.700	0.868	0.740	0.640	0.564	0.480	0.380	0.300	0.150	0.100	0.050	0.000	0.000	0.000

Dwell

[Volt]	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	14.0	15.0	16.0
[ms]	6.300	6.300	6.300	4.700	3.600	3.000	2.650	2.400	2.200	1.980	1.900	1.780	1.670	1.500	1.350	1.250

Pick-Up Table

RPM	900	1150	1800	2700	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500
[deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes

Config base F4 312R 1000

USB: F4_312R_1000

Firmware Version: F4_312R_1000

Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

Page - General

Engine Type: use the UP/DOWN arrow keys to select the type of engine you are using. Through left click of the mouse you can see different engine type. With right click of the mouse you find information about it.

Coupling angle: is the angle between tooth 0 and TDC 1.

Tooth 0 for a crank pattern with equi-spaced teeth is the crank tooth following the cam signal.

Tooth 0 for non equi-spaced crank patterns such as 24-2 is the tooth immediately following the missing teeth after the cam signal is seen.

Scam inhibition limit [RPM]: Above this RPM the engine is able to operate without the need for a cam phase sensor.

Pneumatic CAM – is possible to use on B5, pneumatic mode to define the correct phase without a cam sensor.

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With **speed and throttle thresholds** you fix **lower** and **upper** range for use this strategy. Outside this range, ECU can't recognize the correct phase. If ECU already know the correct phase, will no lost the phase if goes over the range.

Phased-like injection ON – during not phased engine, ECU pilot injectors every two revolution with an injection time = base map.

Phased-like injection OFF + ratio – during not phased engine, ECU pilot injectors each revolution with an injection time = base map x ratio

Teeth interval – teeth range for determinate the minimum pressure

Min. variation [A/D]: minimum change in pressure, from barometric pressure, allowed to accept as a good value.

Engine will be phased in pneumatic mode only if:

- Pcam variation is bigger than barometric pressure – min Pcam variation ($P_{cam} > P_{baro} - minP_{camVar}$)
- Minimum pressure value is into vacuum interval
- RPM and throttle values are into lower and upper range.

Signals and Miscellaneous Settings

Stop signal: The Stop input is used as a kill switch, when the input is active the engine will not run. Choose is active when have a ground contact (LOW) or 12V contact (HIGH).

Drop switch: this is the switch for the activation of the kill 'drop switch' strategy (used for sensors, which indicate when the bike has fallen over). Choose is active when have a ground contact (LOW) or 12V contact (HIGH).

Shift signal: The shift input is used as a quick shift switch, when the input is active the gear shift strategy can starts. Choose is active when have a ground contact (LOW) or 12V contact (HIGH).

Tacho pulses for revolutions: Enter how many pulses per revolution, requires the rev counter to see the correct value (set from 1 to 2 pulses per revolution).

Stop delay: delay time for enable stop condition after stop input activation, expressed in milliseconds

Velocity Reference: select which is the speed value that need to be used for the correction by velocity.

Traction C. Manual adjust: set if the traction control level is selected by dashboard or external pad.

Immobilizer function: set disable for switch OFF the warning light on the dashboard regarding immobilizer security. With "enable", warning light will be ON but it's possible to run the engine.

PWM frequencies outputs

In this section, we set the different frequencies of output PWM signals, exhaust valve, EBS and TSS valve.

CAN channel: select the address for each different frame. Default setting for communication with controller lambda M163 is 300. For more details regarding Ext. Control CAN frames see the end of the manual.

Exhaust valve control

This configuration allows you to set the frequency of the pilot valve, and movement speed through the parameters Kp and Ki.

Through the cell you enter the tolerance value expressed in bits measured by the potentiometer valve. More is this range, and more natural movement will be. Es.450bit value, tolerance 5bit. It will be an upgrade if the readout is between 445 and 455.

Injection Battery offset

This table is of significant importance for the system to calculate the injection time. At different battery voltage levels the injector will take a specific time is 'Ms' (milliseconds) to go from fully closed when the signal is received to fully open. The lower the voltage the longer this will take, but there is course fuel being injected during this phase.

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You are free to choose your own 'break point' within the top row. Note: This data is sometimes referred to as injector 'dead time'

Dwell time

This table controls the duration of the ignition coil 'trigger' pulse as a function of battery voltage in Ms (milli seconds). You are free to choose your own 'breakpoints' within the top row.

Pick-up Offset

This table contains the correction to spark advance at differing RPM values (applied to all cylinders) to correct for errors resulting from the signal delay from the crank pick up.

Page Configuration CAN acquisition

This page contains the layout of the packets (frames) transmitted by the ECU at 1mbps. The content of each is fixed to 4 Words per packet with channel 1 being indicated the channel at the furthest left.

All CAN data is transmitted in Motorola format (MSB first, LSB last)

The only choices you need to make are the ID of the packet and the frequency of the transmission. The ID can be any 11bit hexadecimal value between 0 and 7FF.

At the time of ordering you can choose to have the CAN Closed or Open at the ECU, default = Closed.

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Configuration (CAN-acquisition)

Frame	ID (hex)	Frequency	Channel 1	Channel 2	Channel 3	Channel 4
1	200	0FF	RPM	Mean RPM (over 1 Revol.)	Programmable Mean RPM	Engine Acceleration
2	204	0FF	Revolutions	Smot Errors	Scam Errors	Gap Errors
3	208	0FF	-	-	-	-
4	20C	0FF	Terog 1	Terog 2	Terog 3	Terog 4
5	210	0FF	TerogBase 1	TerogBase 2	TerogBase 3	TerogBase 4
6	214	0FF	Advance 1	Advance 2	Advance 3	Advance 4
7	218	0FF	TetaBase	Phase	FaseBase	CPU Flags
8	21C	0FF	KJAux 1	KJAux 2	KJAux 3	KJAux 4
9	220	0FF	KAAux 1	KAAux 2	KAAux 3	KAAux 4
10	224	0FF	KJCrnk	DAPickUp	OffsVbat Low	Dwell
11	228	0FF	KJTH20	KATH20	KJTAir	KATAir
12	22C	0FF	KJPAir	KAPAir	KJGear	KAGear
13	230	0FF	KJVel	KAVel	KJAcc	KAAcc
14	234	0FF	KJSpeedLim	KASpeedLim	Advance Transient	Injection Transient
15	238	0FF	DJDInTrpm	DJDInTh2o	DJDInT	DADInT
16	23C	0FF	KJbnc 1	KJbnc 2	KJbnc 3	KJbnc 4
17	240	0FF	KAbnc 1	KAbnc 2	KAbnc 3	KAbnc 4
18	244	0FF	KJbnc	KAbnc	KFBnc	Milliseconds
19	248	0FF	-	-	-	-
20	24C	0FF	Throttle	Throttle Variation	Throttle Potentiometer	Lambda
21	250	0FF	Battery	Water Temperature	Air Temperature	Air Pressure
22	254	0FF	Battery AD	Water Temperature AD	Air Temperature AD	Air Pressure AD
23	258	0FF	Gear	Map	Gear Potentiometer	Map-Select Potentiometer
24	25C	0FF	Exhaust Valve Position	Exhaust Valve AD	EBS Valve Duty-Cycle	TSS Valve Duty-Cycle
25	260	0FF	Velocity Front	Velocity Rear	Space Front	Space Rear
26	264	0FF	Engine Flags	Error Flags	Digital I/Os	Shift Flags
27	268	0FF	Map-Tuning Updates Count	Current Injection Map-Cell [X,Y]	Current Advance Map-Cell [X,Y]	Map-Tuning Flags

USB F4_312R_1000 F4_312R_1000 Firmware Version

Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

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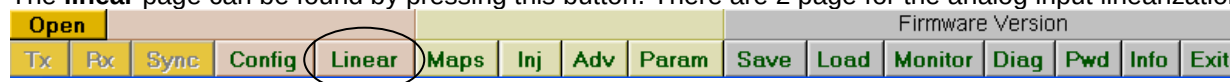
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Page Linearization

The **linear** page can be found by pressing this button. There are 2 page for the analog input linearization.



Mon226MV v1.1

Linearizations

Throttle

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A/D	86	135	183	232	281	330	378	427	476	525	573	622	671	720	768	817
[deg]	2.3	7.6	12.9	18.3	23.6	28.9	34.2	39.5	44.9	50.2	55.5	60.8	66.1	71.5	76.8	82.1

Water Temperature

A/D	183	251	310	378	456	541	628	713	791	857	885	910	949	977	996	1008
[°C]	125.0	110.0	100.0	90.0	80.0	70.0	60.0	50.0	40.0	30.0	25.0	20.0	10.0	0.0	-10.0	-20.0

Air Temperature

A/D	183	251	310	378	456	541	628	713	791	857	885	910	949	977	996	1008
[°C]	110.0	100.0	90.0	80.0	70.0	60.0	50.0	40.0	25.0	20.0	15.0	7.0	0.0	-10.0	-20.0	-30.0

Air Pressure

A/D	187	240	292	344	397	449	502	554	606	659	711	763	816	868	921	973
[mBar]	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050

Barometric Pressure Measurement Settings

Blind	Interval Start	2
Teeth	Count	0
Samples	Length	1
Buffer	Timeout [s]	1

Measure Adjustment

	K	0	0	0	0	0	0	0	0
Throttle	0.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	0.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	0.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	0.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	0.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	0.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

USB F4_312R_1000 F4_312R_1000 Firmware Version

Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

Settings within this page define the calibration of the following inputs

Throttle,
Air pressure,

Water temperature,
Barometric pressure

Air temperature,

Throttle – for obtain the right linearization of the TPS input, proceed in the manual way by clicking on the “1”, “16” cells and then interpolate button. *Remember to send the configuration to the ECU.*

Barometric pressure – on B5 it's possible to use PCAM sensor also for recognize the barometric pressure value. This area is used for set the better position and condition for obtain the pressure value from the pneumatic sensor.

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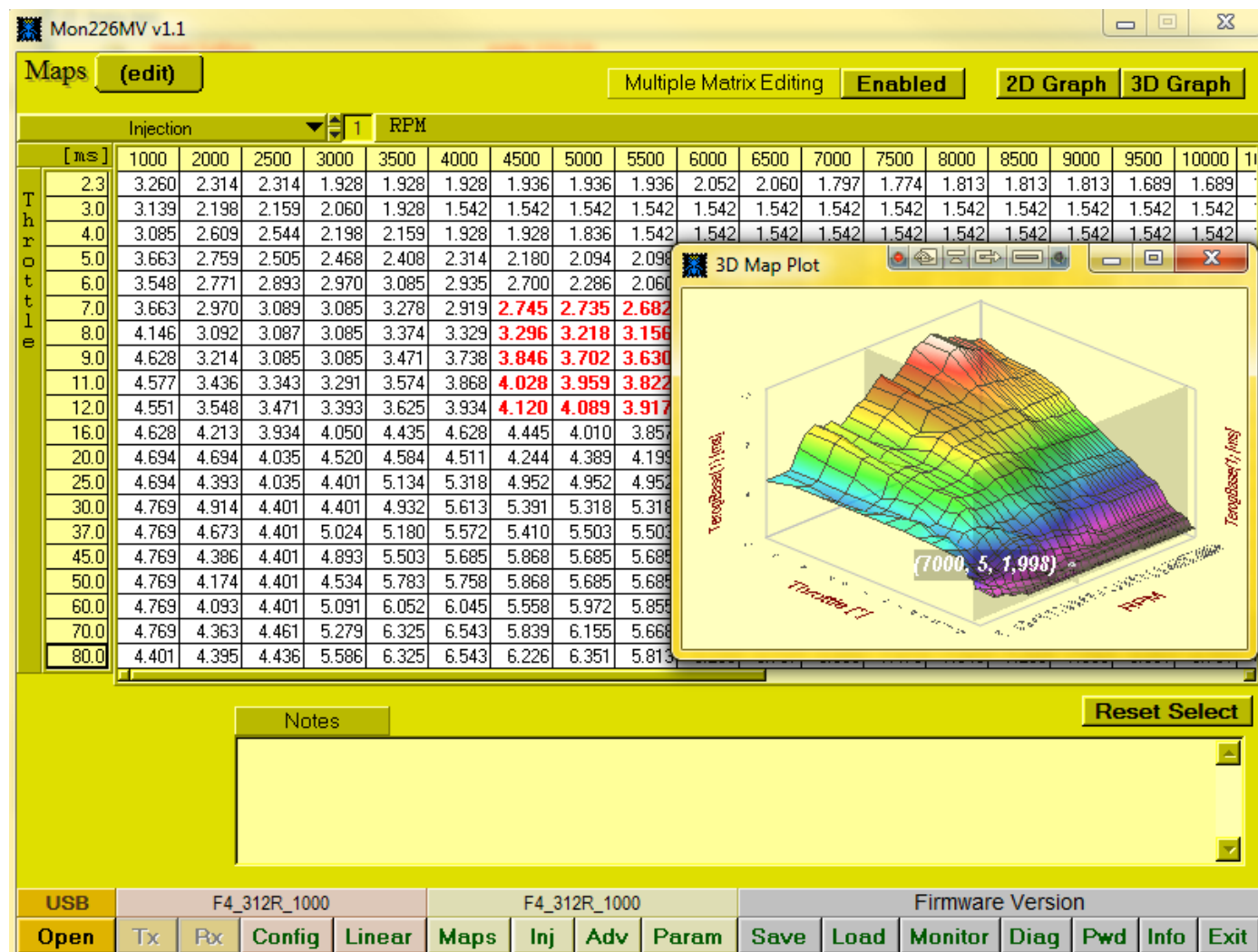
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Page Maps

The Map editor can be found by pressing this button.



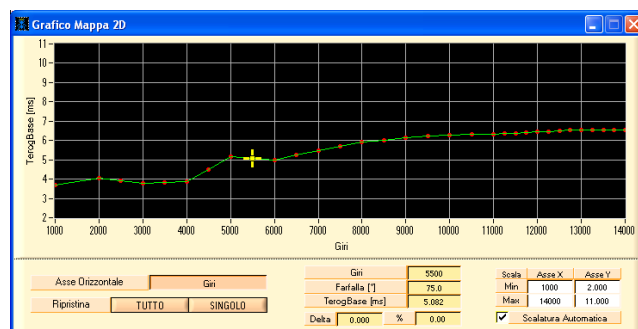
In Edit mode a 3D or 2D representation is automatically displayed as a separate window as shown here, this can be minimised if necessary.



Within the Edit window you can make changes to both the Breakpoints and the contents of the Cells.

The upper buttons menu contains all of the maps you can edit; the button on the left is used for have an independent map for every cylinders or only one map for all the cylinders.

IMPORTANT – If you disable 'Multiple map' all of the map settings within these pages will be deleted.



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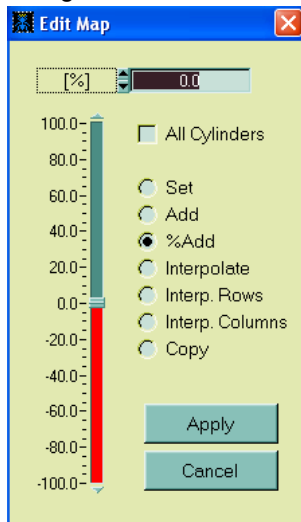
Maps / Edit / Injection

Injection		1 RPM				
[ms]		1000	2000	2500	3000	3500
Thr	2.3	3.260	2.314	2.314	1.928	1.928
	3.0	3.139	2.198	2.159	2.060	1.928
	4.0	3.085	2.609	2.544	2.198	2.159

Choose Injection from the menu to display a table of fuel injector Ms plotted against RPM / Throttle.

Use the Arrow keys to decide which cylinder you are working with.

Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.



Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

All cylinders – Tick here if you want your changes to be applied to all cylinders, not just the one you are working on

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

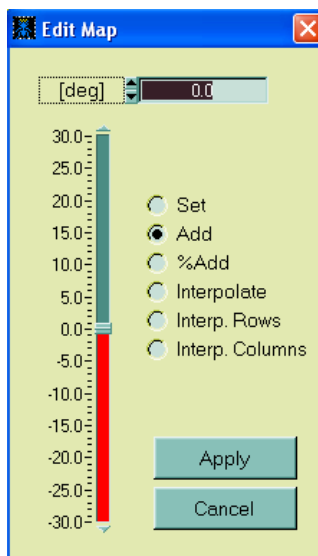
Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

Copy - Copies the selected cell values to all other cylinders in this group.

Maps / Edit / Advance

Choose Advance from the pull down menu to display a table of spark advance in Deg plotted against RPM / Throttle.



Individual cylinder mapping is not available

Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

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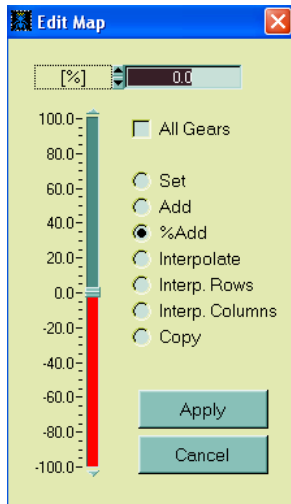
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Maps / Edit / Injection correction by gear, by velocity

Injection correction as a function of RPM/TPS with each gear being available via the up/down toggle at top left
KJGear (KJvel)



Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

All gear – Tick here if you want your changes to be applied to all gears, not just the one you are working on

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

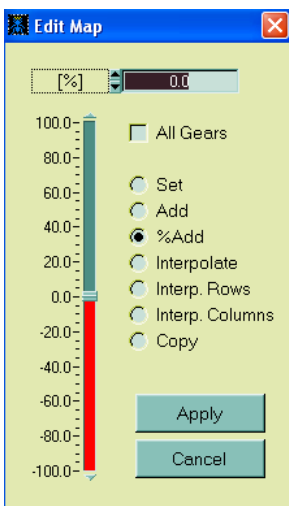
Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

Copy - Copies the selected cell values to all other cylinders in this group.

Maps / Edit / Advance correction by gear, by velocity

Advance correction as a function of RPM/TPS with each gear being available via the up/down toggle at top left
KAGear (KAVel)



Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

All Gears – Tick here if you want your changes to be applied to all gears, not just the one you are working on

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

Copy - Copies the selected cell values to all other cylinders in this group.

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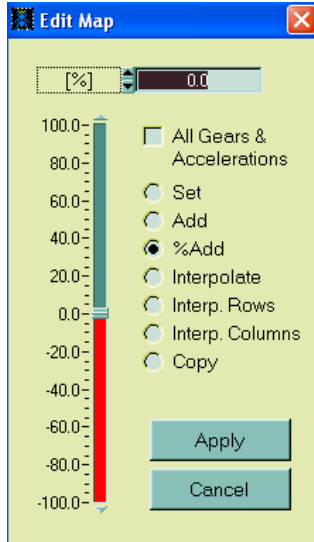


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Maps / Edit / Injection Correction by Acceleration (traction control)

For acceleration strategy details see the separated manuals.

Injection correction percentage as a function of TPS/RPM/ACCELERATION - **KJAcc**



Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

All Gears & Accelerations – Tick here if you want your changes to be applied to all gears and all accelerations, not just the one you are working on

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

Copy – Copies the selected cell values to all other cylinders in this group.

Acceleration	
1)	500
2)	800
3)	1500
4)	2000
5)	2500
6)	3000

In this box you can choose 6 different values of engine acceleration. For each value you have different maps for each gear, so in this window you have 36 plans listed.

Maps / Edit / Advance Correction by Acceleration (traction control)

Injection correction additive as a function of TPS/RPM/ACCELERATION - **KAAcc**

Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

All Gears & Accelerations – Tick here if you want your changes to be applied to all gears and all accelerations, not just the one you are working on

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

Copy – Copies the selected cell values to all other cylinders in this group

In this box you can choose 6 different values of engine acceleration. For each value you have different maps for each gear, so in this window you have 36 plans listed.

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Maps / Edit 5.0 / Cranking corrections

This is the starting enrichment map **KJCrank** with the temperature at the left side and the number of crank rotations on the upper row. Within the table are the gains to be applied to the map during the start procedure.

To help understand this, choose a typical temperature at the left side (example +30°C) for the first 5 rotations of the engine the base fuel map will be multiplied by 2.01, from 5-10 rotations this will drop to 1.82 and onwards until the far right hand column is reached. The map will then work from this final cell downwards as the engine warms up and normal running temperature is reached.

Mon226MV v1.1

Maps (edit) 2D Graph 3D Graph

Cranking Correction Revolutions

K	10	100	150	200	250	300	320	340	360	380	400	420	440	460	480	500	520	540	!
-20.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
-18.0	2.002	2.002	2.002	2.002	1.531	1.444	1.386	1.271	1.213	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
-15.0	2.002	2.002	2.002	2.002	1.531	1.444	1.386	1.271	1.213	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
-10.0	2.002	2.002	2.002	2.002	1.531	1.444	1.386	1.271	1.213	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
-5.0	2.002	2.002	2.002	2.002	1.531	1.444	1.386	1.271	1.213	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
0.0	1.884	1.884	1.884	1.884	1.473	1.386	1.271	1.213	1.155	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
10.0	1.555	1.414	1.414	1.414	1.414	1.271	1.213	1.155	1.155	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
20.0	1.426	1.296	1.296	1.296	1.296	1.213	1.155	1.155	1.155	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
30.0	1.362	1.238	1.238	1.238	1.238	1.155	1.155	1.155	1.155	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
40.0	1.297	1.179	1.179	1.179	1.179	1.155	1.155	1.155	1.155	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
50.0	1.202	1.202	1.202	1.202	1.202	1.155	1.155	1.155	1.155	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
60.0	1.225	1.225	1.225	1.225	1.115	1.155	1.155	1.155	1.155	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
70.0	1.208	1.208	1.208	1.208	1.151	1.155	1.155	1.155	1.155	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
80.0	1.155	1.155	1.155	1.155	1.155	1.155	1.155	1.155	1.155	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
90.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
100.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
110.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
120.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
130.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
140.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Notes Reset Select

USB F4_312R_1000 F4_312R_1000 Firmware Version

Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

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Maps / Edit / PWM duty cycle (exhaust valve, TSS and EBS)

Cell values are defined as a percentage

Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

All gear – Tick here if you want your changes to be applied to all gears, not just the one you are working on

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

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Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

Copy - Copies the selected cell values to all other cylinders in this group.

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Maps / Mapping overview

For automapping details see the separated manuals.

The mapping is achieved via the Maps button; sequential presses of this button move you between the mapping window as shown on this page and the Edit window as shown before.



The mapping window allows you to make changes at individual cells where there is a corresponding breakpoint of both RPM and Throttle or for turbo engines RPM / Air pressure.

This page gives you 2 options for mapping.

- Manual tuning where the operator uses the 'sliders' or numeric fields at the bottom of the page to define the values of spark advance and fuel at each cell.
- Auto tune – In this mode a fixed AFR value is used as a target and the ECU will automatically adjust the fuel for you. You also have the opportunity to use Auto Tune both on the dyno and on the road.

Your page will look like this when neither the Manual or Auto methods have been chosen.

Mon226MV v1.1

Maps (tuning) Tuning OFF Manual Auto Off

Injection 1 RPM All Cylinders

[ms]	1000	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	11000
2.3	3.260	2.314	2.314	1.928	1.928	1.928	1.936	1.936	1.936	2.052	2.060	1.797	1.774	1.813	1.813	1.813	1.689	1.689	1.689
3.0	3.139	2.198	2.159	2.060	1.928	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542
4.0	3.085	2.609	2.544	2.198	2.159	1.928	1.928	1.836	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542
5.0	3.663	2.759	2.505	2.468	2.408	2.314	2.180	2.094	2.098	1.997	1.889	1.998	2.044	1.928	1.928	1.928	1.928	1.928	1.928
6.0	3.548	2.771	2.893	2.970	3.085	3.278	2.919	2.745	2.735	2.682	2.218	2.113	2.222	2.074	2.060	2.060	2.060	2.060	2.060
7.0	3.663	2.970	3.089	3.085	3.278	2.919	2.745	2.735	2.682	2.218	2.113	2.222	2.074	2.060	2.060	2.060	2.060	2.060	2.060
8.0	4.146	3.092	3.087	3.085	3.374	3.329	3.296	3.218	3.156	2.630	2.494	2.495	2.328	2.307	2.164	2.069	2.049	2.049	2.049
9.0	4.628	3.214	3.085	3.085	3.471	3.738	3.846	3.702	3.630	3.041	2.874	2.767	2.582	2.556	2.268	2.078	2.037	2.037	2.037
11.0	4.577	3.436	3.343	3.291	3.574	3.868	4.028	3.959	3.822	3.424	3.319	3.305	3.164	2.950	2.834	2.768	2.407	2.213	2.213
12.0	4.551	3.548	3.471	3.393	3.625	3.934	4.120	4.089	3.917	3.615	3.541	3.574	3.454	3.148	3.118	3.114	2.592	2.300	2.300
16.0	4.628	4.213	3.934	4.050	4.435	4.628	4.445	4.010	3.857	3.934	4.054	4.261	4.259	4.297	3.857	3.818	3.590	3.590	3.590
20.0	4.694	4.694	4.035	4.520	4.584	4.511	4.244	4.389	4.199	4.199	4.477	4.673	4.422	4.422	4.076	3.993	3.836	3.875	3.875
25.0	4.694	4.393	4.035	4.401	5.134	5.318	4.952	4.952	4.952	5.102	4.952	4.952	4.952	5.026	4.723	4.355	4.355	4.355	4.355
30.0	4.769	4.914	4.401	4.401	4.932	5.613	5.391	5.318	5.318	5.318	5.669	5.614	5.614	5.727	5.534	5.132	4.765	4.765	4.765
37.0	4.769	4.673	4.401	5.024	5.180	5.572	5.410	5.503	5.503	5.685	6.310	6.299	6.299	6.112	6.038	5.693	5.693	5.693	5.693
45.0	4.769	4.386	4.401	4.893	5.503	5.685	5.868	5.685	5.685	6.052	6.574	6.601	6.601	6.601	6.667	6.404	6.404	6.404	6.404
50.0	4.769	4.174	4.401	4.534	5.783	5.758	5.868	5.685	5.685	6.235	6.801	6.969	6.969	6.969	7.039	6.762	6.762	6.762	6.762
60.0	4.769	4.093	4.401	5.091	6.052	6.045	5.558	5.972	5.855	5.623	6.235	6.235	7.335	7.335	7.261	7.114	7.043	7.481	7.481
70.0	4.769	4.363	4.461	5.279	6.325	6.543	5.839	6.155	5.668	6.092	6.683	6.886	7.473	7.746	7.079	7.405	7.856	8.022	8.022
80.0	4.401	4.395	4.436	5.586	6.325	6.543	6.226	6.351	5.813	6.230	6.737	6.886	7.473	7.943	7.260	7.590	8.081	8.761	8.761

Enabled Min. Max. TH20 0.0 60.0 90.0 Over-Rev Extra-Margin 150 Cut-Off Cranking Transient Save Load

Cell Current Tolerance RPM 0 +/- 200 Throttle 0.0 +/- 3.0 Lambda Current Set-Points Tolerance 12.5 12.5 12.5 12.5 +/- 0.5 Tracking Mode Fine

Manual Current Corrected Correction Step Injection 0.000 0.000 1.000 Freeze 0.010 Advance 0.0 0.0 0.0 Freeze 1.0

USB F4_312R_1000 F4_312R_1000 Firmware Version

Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

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MICROTEC®

Maps / Page function overview

RPM – value of engine RPM

Throttle – Value of Throttle sensor

Manual tuning / Injection / Current – Value of cell taken from the map

Manual tuning / Injection / Corrected – Value of injection time as a result of the manual adjustments.

Manual tuning / Advance / Current – Value of cell taken from the map

Manual tuning / Advance / Corrected – Value of advance as a result of the manual adjustments.

Freeze – Applies the adjustment to the specific cell within the ECU and then automatically returns to nil offset.

Lambda – Current value of the lambda sensor in AFR. Through the button Lambda 1 or 2 you can set with how lambda sensor make automapping. For example in the picture is set lambda 1.

Lambda / Set point - Your desired target AFR value. You can choose from 3 different set point.

Lambda tolerance - +/- gate around your target AFR that is deemed to be acceptable. Once within this boundary to further Auto tuning would occur in Auto tune mode.

Auto-tuning – In Auto tuning mode the engine must be latched into a cell for this amount of time before any correction will occur. You can set this speed from the menu **tracking mode**. Fine, medium, coarse.

Enabled – This LED lights when the 'lambda searching phase' of the tuning strategy is permitted (not considering the enable setting of single cells). The lambda searching phase is inhibited during cranking, gear change, injection transients, engine cut-off, when the water temperature exceeds the given limits, or when the engine speed is near the limit set in the "Parameters" page..

Cranking – LED turns from brown to red during engine start. When active mapping will be inhibited.

Over rev – LED turns from brown to red when the engine is within 150RPM of the limiter for example.

Cut off – LED turns from brown to red when the 'cut off' strategy is enabled. When active mapping will be inhibited.

Transient - LED turns from brown to red when the transient strategy is active. When active mapping will be inhibited.

TH2O – Value of water temperature.

TH2O / Min-Max – Values of water temperature which are considered as normal for the operation of the engine, when outside of these limits the LED will turn red and mapping will be inhibited

TH2O	84.1	60.0	90.0
------	------	------	------

Injection 1		RPM														All Cylinders		
[ms]		1000	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500
Thr	2.3	3.260	2.314	2.314	1.928	1.928	1.928	1.936	1.936	1.936	2.052	2.060	1.797	1.774	1.813	1.813	1.813	1.689
	3.0	3.139	2.198	2.159	2.060	1.928	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542
	4.0	3.085	2.609	2.544	2.198	2.159	1.928	1.928	1.836	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542	1.542

Injection 1 – Use the pull down to visualize the map that you plan to work with

Cylinders – This option lets you choose to apply your mapping to all cylinders equally or to specific cylinders.

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MICROTEC®

Maps / Manual mapping

Before you begin mapping it is important to make sure that you have transmitted the latest version of your configuration and 'start map' into map slot 1. The ECU 'start map' is the one provided by your ECU supplier or one you believe to be closest to the one needed for this engine.

1. Make sure that your external map switch is in position 1 (open circuit)
2. Run the engine and check that all sensor readings are correct.
3. Warm up the engine until the water temperature value is within the correct zone
4. Ensure that there are no red LEDs showing
5. Enter a value for your desired AFR value and tolerance; this is not used to control the ECU it is simply used to turn the value from yellow to red when you have manually achieved the target.
6. Choose whether to map the injection on 'all cylinders' or an individual one
7. Use the left pull down to visualise the map you plan to work in.

To begin manual mapping press the **Manual** button at the top of the page. The PC will now read back from the ECU the latest version of the injection and spark map. At the top of the page you will see a series of messages.

- Synchronising mapping data
- Loading injection data
- Loading advance data
- Manual tuning mode (you are now ready to map)



You will notice that the file name you are now working with at the bottom of the screen is prefixed by a *, this is to indicate that the map has been taken from the ECU and not yet stored on your PC.

Adjust the engine using the dyno so that the throttle and RPM align with your chosen cell. Correct engine state will be indicated by the RPM and TPS values changing from yellow to red and the cell in the main window changing to grey as shown here.

10	4.030	3.743	3.41
33	4.232	3.989	3.91
32	4.432	4.313	4.21
15	4.701	4.485	4.31
34	4.726	4.485	4.31

Use the sliders or double click the value and use up/down arrow keys to change the fuel injection time and the spark advance. Your changes are applied in real time to the ECU so be careful. When you are happy with the results, press the Freeze button to apply either injection or advance changes. After the change has been permanently written the injection correction will return to 1.000 and the advance to 0.0.

Manual Tuning	Current	Corrected	Correction	
Injection	4.481	4.965	1.108	Freeze
Advance	49.0	46.4	-2.6	Freeze

The Current and corrected windows give a real time readout of the existing ECU setting and the new setting, after the new settings have been written, both will be the same and the cell in the main window will be updated and showing in bold red to indicate that a change has been made

609	4.733	4.733
852	5.746	5.746
726	5.047	5.047

Now move onto the next cell you wish to work on. When all mapping work is done use the OFF button at top right. All of the modified cells are showing in bold red, including the ones in other pages.

If you want to make some manual changes at this stage you will need to exit the Map tuning page and use the Map edit page, this is easily done by pressing the Map button at the bottom of the page, the red bold cells are still showing and you are free to make manual changes.

This file must now be saved, use the Save button, choose Mapping and remember to remove the * prefix or you will not be allowed to save the file.



To finish the process, simply Transmit this map back to the ECU into either map 1 or map 2.

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MICROTEC®

Maps / Auto mapping - Dyno

Before you begin mapping it is important to make sure that you have transmitted the latest version of your configuration and 'start map' into map slot 1. The ECU, the 'start map' is the one provided by your ECU supplier or one you believe to be closest to the one needed for this engine.

1. Make sure that your external map switch is in position 1 (open circuit)
2. Run the engine and check that all sensor readings are correct.
3. Warm up the engine until the water temperature value is within the correct zone
4. Ensure that there are no red LEDs showing
5. Enter values for your lambda and PI controls
6. Define the cells that you want the Auto tuning to take place in. You can choose between 3 different break point by a single, double or triple click in cell. Also you can choose an entire row or column.
7. Choose whether to map the injection on 'all cylinders' or an individual one
8. Use the left pull down to visualise the map you plan to work in.

It is very important when Auto tuning to specify which areas of the map this tuning should take place in. These cells can be defined by a double click in the map cell window to change colors, an example of this is shown here.

The end result can be saved and re-loaded at any time using these buttons.



[ms]	1000	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	1
2.0	2.638	1.912	1.881	1.550	1.685	1.187	1.187	1.187	1.187	1.187	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
2.3	2.539	1.955	1.859	2.020	1.847	1.350	1.354	1.387	1.344	1.252	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
2.7	2.605	1.939	1.695	1.519	1.523	1.516	1.747	1.747	1.747	1.747	1.544	1.524	1.524	1.524	1.524	1.524	1.524	1.524	1.524
3.0	2.605	1.930	1.649	1.516	1.319	1.319	1.319	1.550	1.550	1.418	1.418	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
4.0	2.670	2.426	2.016	1.803	1.566	1.534	1.220	1.154	1.451	1.418	1.418	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
5.0	3.132	3.070	2.524	2.054	1.899	1.830	1.853	1.704	1.706	1.657	1.674	1.657	1.649	1.649	1.649	1.649	1.649	1.649	1.649
6.0	3.033	2.481	2.539	2.450	2.222	2.206	1.978	1.735	1.626	1.595	1.526	1.533	1.549	1.549	1.549	1.549	1.549	1.549	1.549
7.0	3.132	2.846	2.696	2.735	2.520	2.478	2.377	2.034	1.781	1.650	1.499	1.694	1.797	1.779	1.733	1.681	1.681	1.681	1.681
8.0	3.956	3.951	3.303	3.183	3.054	2.828	2.650	2.613	2.523	2.540	2.318	1.993	1.894	1.953	1.827	1.850	1.813	1.813	1.813
12.0	4.055	4.264	2.927	2.953	2.864	3.081	3.021	3.485	2.648	2.792	2.663	2.765	2.654	2.559	2.400	2.319	2.308	2.132	2.132
16.0	4.121	3.713	3.500	3.848	3.436	3.317	3.457	3.766	2.935	2.795	3.069	3.111	3.123	3.041	2.858	2.863	2.956	2.727	2.727
20.0	4.220	4.100	3.927	4.145	4.114	3.908	3.880	4.431	4.364	3.868	4.291	3.428	3.500	3.758	3.225	3.117	3.049	2.969	2.969
25.0	4.286	4.023	4.046	4.896	4.959	4.199	4.496	4.224	4.133	3.889	4.373	3.941	3.786	3.692	3.470	3.451	3.569	3.397	3.397
30.0	4.286	4.145	4.688	4.530	5.056	4.371	4.535	4.752	4.562	4.159	4.794	4.427	4.228	4.143	3.790	4.033	3.963	3.962	3.962
36.0	4.286	4.220	3.981	4.517	5.005	4.376	4.824	4.797	4.738	4.884	5.143	5.189	4.738	4.537	4.229	4.225	4.233	4.179	4.179
40.0	4.286	4.121	4.368	4.398	4.636	4.828	4.830	5.099	4.989	5.230	5.594	5.535	5.462	5.272	5.067	4.879	5.061	5.305	5.305
50.0	4.286	4.121	4.827	4.419	4.824	5.225	4.766	5.064	5.018	5.480	6.051	5.879	5.784	5.608	5.282	5.372	5.537	5.609	5.609
60.0	4.286	3.824	4.821	4.813	5.110	5.359	4.669	5.048	5.465	5.641	6.168	6.366	6.685	7.663	7.396	6.847	5.931	6.122	6.122
70.0	4.286	3.878	4.750	4.873	5.172	5.308	5.163	5.232	5.249	5.544	6.060	6.292	6.405	6.729	6.149	6.165	6.474	6.845	6.845
81.0	4.286	4.095	4.636	4.795	4.300	4.171	5.333	5.624	5.376	5.307	6.050	6.095	6.621	7.687	7.532	7.105	7.182	8.267	8.267

IMPORTANT – Auto mapping will only take place in a cell that has been activated in this way.

To begin Auto Tuning press the Auto button at the top of the page. The PC will now read back from the ECU the latest version of the injection and spark map. At the top of the page you will see a series of messages.

- Synchronising mapping data
- Loading injection data
- Loading advance data
- Lambda match or waiting for lambda (you are now ready to start)



You will notice that the file name you are now working with at the bottom of the screen is prefixed by a *, this is to indicate that the map has been taken from the ECU and not yet stored on your PC.

0.1	4.030	3.743	3.91
53	4.232	3.989	3.91
32	4.432	4.313	4.2
15	4.701	4.485	4.3
34	4.776	4.485	4.3

Adjust the engine using the dyno so that the throttle and RPM align with your chosen cell. Correct engine state will be indicated by the RPM and TPS values changing from yellow to red and the cell in the main window changing to grey as shown here.

Providing that all of the following conditions have been met, the ECU will begin to adjust the injection time to your target AFR. This will be seen in the main cell window by the text changing to red and the numbers moving. The manual sliders are inoperable during auto tuning.

- Cell must be activated for Auto Tuning
- Water temperature must be within limits
- No transient or start strategy active
- The engine is not in 'Cut off' or 'Over rev' status
- The engine has been locked onto the cell for at least the 'Hold time'
- The current lambda value must be outside of the target tolerance.

Once the target AFR has been achieved and the cell value stops changing, move onto the next cell and repeat

When all mapping work is done use the OFF button at top right. All of the modified cells are showing in bold red, including the ones in other cylinder pages.

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Maps / Auto mapping – Dyno - continued

If you want to make some manual changes at this stage you will need to exit the Map tuning page and use the Map edit page, this is easily done by pressing the Map button at the bottom of the page, the red bold cells are still showing and you are free to make manual changes.

This file must now be saved, use the Save button, choose Mapping and remember to remove the * prefix or you will not be allowed to save the file.

Open										Firmware Version							
Tx	Rx	Sync	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit		

To finish the process, simply Transmit this map back to the ECU into either map 1 or map 2.

Maps / Auto mapping – Road tune

Before you begin mapping it is important to make sure that you have transmitted the latest version of your configuration and 'start map' into map slot 1. The ECU, the 'start map' is the one provided by your ECU supplier or one you believe to be closest to the one needed for this engine.

1. Make sure that your external map switch is in position 1 (open circuit)
2. Run the engine and check that all sensor readings are correct.
3. Warm up the engine until the water temperature value is within the correct zone
4. Ensure that there are no red LEDs showing
5. Enter values for your lambda and PI controls
6. Define the cells that you want the Auto tuning to take place in (see below)
7. Choose whether to map the injection on 'all cylinders' or an individual one
8. Use the left pull down to visualise the map you plan to work in.

It is very important when Auto tuning to specify which areas of the map this tuning should take place in. These cells can be defined by a double click in the map cell window to change color, an example of this is shown here.

		[ms]	1500	2100	3000	4000	5000	5500	6000	6500	6750	7000	7250	7500	7750	8000	8250	8500	8750	9000
Throttle	14	57	1.959	1.694	1.520	1.314	1.068	0.904	0.804	0.780	0.739	0.698	0.658	0.638	0.638	0.638	0.638	0.638	0.638	0.719
	28	51	1.685	1.355	1.355	1.427	1.427	1.340	1.168	1.122	1.140	1.158	1.128	1.100	1.004	0.907	0.864	0.820	0.842	0.863
	43	47	1.836	1.643	1.520	1.470	1.362	1.275	1.448	1.265	1.317	1.369	1.359	1.349	1.243	1.136	1.089	1.042	0.993	0.943
	58	39	2.633	2.300	2.219	2.013	1.753	1.669	1.904	1.693	1.685	1.637	1.552	1.456	1.431	1.396	1.376	1.355	1.274	1.192
	103	30	2.949	2.751	2.751	2.423	2.213	2.129	1.981	1.972	1.826	1.679	1.684	1.688	1.812	1.935	1.928	1.923	1.886	1.849
	152	32	3.475	3.327	3.327	3.122	2.544	2.420	2.215	2.205	2.184	2.162	2.259	2.355	2.212	2.068	2.444	2.819	2.752	2.684
	191	32	3.897	3.696	3.696	3.368	2.876	2.793	2.427	2.481	2.430	2.379	2.478	2.576	2.401	2.226	2.571	2.916	2.943	2.969
	229	24	4.319	4.148	4.148	3.985	3.574	3.327	2.999	2.722	2.950	3.177	3.078	2.979	2.860	2.741	3.075	3.408	3.453	3.498
	272	39	4.238	4.070	4.070	4.070	4.030	3.749	3.467	3.295	3.395	3.494	3.548	3.601	3.426	3.251	3.520	3.788	3.767	3.746
	321	33	4.548	4.432	4.432	4.353	4.232	3.989	3.951	4.192	4.243	4.294	4.335	4.375	4.068	3.760	4.077	4.394	4.413	4.432
	381	33	4.548	4.432	4.432	4.432	4.432	4.313	4.232	4.484	4.609	4.733	4.899	5.065	4.725	4.384	4.671	4.957	4.960	4.962
	452	14	5.087	4.615	4.615	4.615	4.701	4.485	4.356	4.485	4.852	5.219	5.456	5.692	5.238	4.783	5.454	6.124	6.103	6.081
	480	31	5.087	4.764	4.764	4.764	4.726	4.485	4.306	4.409	4.726	5.042	5.405	5.768	5.373	4.977	5.739	6.501	6.404	6.306
	519	29	5.087	4.873	4.873	4.873	4.744	4.485	4.270	4.356	4.599	4.842	5.288	5.734	5.510	5.286	6.028	6.770	6.620	6.469
	550	00	5.291	5.139	5.113	5.006	4.931	4.618	4.270	4.330	4.626	4.921	5.355	5.788	5.683	5.578	6.228	6.878	6.801	6.723
	600	15	5.418	5.305	5.262	5.089	5.046	4.701	4.270	4.313	4.680	5.046	5.478	5.909	5.893	5.877	6.411	6.944	6.923	6.901
	650	39	5.582	5.433	5.411	5.260	5.153	4.637	4.377	4.398	4.744	5.089	5.456	5.822	6.054	6.286	6.679	7.072	7.115	7.157
	693	30	4.880	4.844	4.774	4.714	4.592	4.572	4.485	4.485	4.809	5.132	5.434	5.735	6.102	6.469	6.836	7.203	7.310	7.417
	750	35	5.047	4.862	4.669	4.570	4.589	4.549	4.438	4.604	4.904	5.203	5.541	5.878	6.185	6.492	6.729	6.966	7.086	7.205
	812	29	5.087	5.778	5.735	5.735	5.219	4.529	4.399	4.701	4.962	5.262	5.620	5.977	6.234	6.491	6.621	6.750	6.880	7.009

This is especially important for tuning under normal road conditions; you should also note that tuning will not take place under transient conditions or if the engine does not have sufficient time at each breakpoint. You may even decide to only activate the full throttle cells.

When using Auto tune modify your driving style so that there are no rapid changes of throttle, use of full power is fine, just get there progressively.

The end result of your selections can be saved and re-loaded at any time using these buttons.
IMPORTANT – Auto mapping will only take place in a cell that has been activated in this way.



To begin Auto Tuning press the Auto button at the top of the page. The PC will now read back from the ECU the latest version of the injection and spark map. At the top of the page you will see a series of messages.



- Synchronising mapping data
- Loading injection data
- Loading advance data
- Lambda match or waiting for lambda (you are now ready to start)

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Disconnect the serial lead from the ECU and begin your road tests, at no time should the map switch be changed or the power to the ECU switched off. If the power to the ECU is switched off the ECU will revert to the original map loaded into map 1. This last comment is also useful to note in the event that you have a failure of the lambda sensor and the corrections applied are not correct.

Auto tuning will occur when driving providing the following conditions are met

- Cell must be activated for Auto Tuning
- Water temperature must be within limits
- No transient strategy active
- The engine is not in 'Cut off' or 'Over rev' status
- The engine has been locked onto the cell for at least the 'Hold time'
- The current lambda value must be outside of the target tolerance.

It should be noted that all of the changes are not being written to the original maps 1 or 2, the

After the road test the ECU should be re-connected to the PC, at this point there are 2 possibilities:

- ECU has been switched off/on during the test
- ECU has remained switched on since it was disconnected from the PC.

Maps / Auto mapping – Road tune - continued

If the power to the ECU has **remained on** throughout the test the ECU will re-synchronise with the PC as soon as you re-connect and press the Open button. This is seen as a series of messages at the top of the screen.

- Synchronising mapping data
- Loading injection data
- Loading advance data

Once this sequence has completed any cells that have been modified in any cylinder will be visible as red bold text.

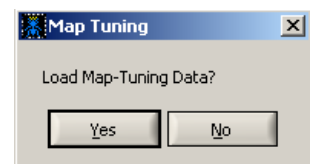
If you want to make some manual changes at this stage you will need to exit the Map tuning page and use the Map edit page, this is easily done by pressing the Map button at the bottom of the page, the red bold cells are still showing and you are free to make manual changes.

This file must now be saved, use the Save button, choose Mapping and remember to remove the * prefix or you will not be allowed to save the file.



To finish the process, simply Transmit this map back to the ECU into either map 1 or map 2.

If the power to the ECU has been **switched off** at any time during the test the ECU will give you the option to 'Load Tuning maps' as soon as you re-connect and press the Open button. This is seen as a pop up window. If you press **Yes**, the changes stored in the ECU will be visible as red bold text. If you press No, the changes are not uploaded.



If you want to make some manual changes at this stage you will need to exit the Map tuning page and use the Map edit page, this is easily done by pressing the Map button at the bottom of the page, the red bold cells are still showing and you are free to make manual changes.

This file must now be saved, use the Save button, choose Mapping and remember to remove the * prefix or you will not be allowed to save the file.



To finish the process, simply Transmit this map back to the ECU into either map 1 or map 2.

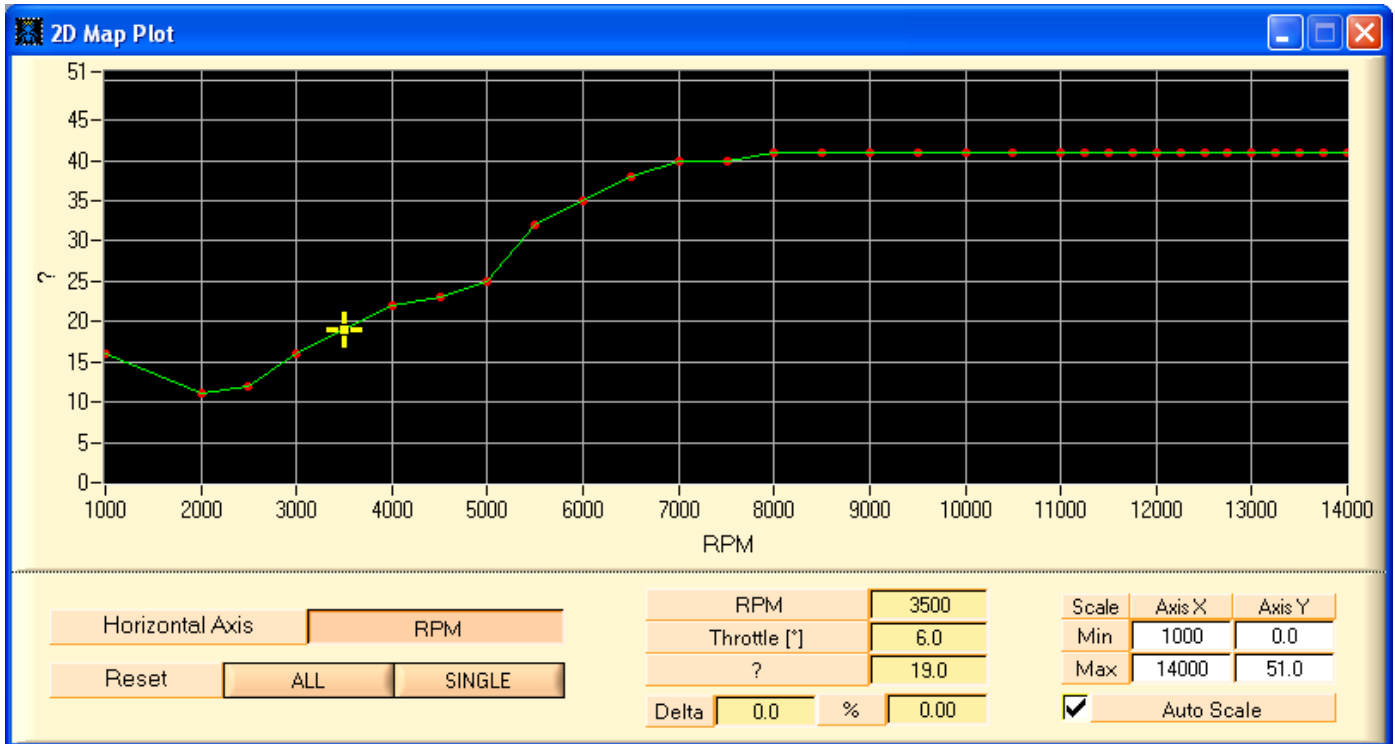
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Map / Graph 2D



With 2D graphics you can make corrections to the plans listed.

With the right mouse button (holding it clicked) you can make a multi-selection point on the chart, to change several values simultaneously, via dragging with the left button on the yellow cross.

You can also view the actual data (in the middle of the graph), change the scale (on the right), choose to display as abscissa the engine rpm or throttle. The changes made are then saved and transmitted.

Through 2D graph you can see the different between two maps.

Copy all the plans listed of injection time for example into another file and open now 2D graph.

You have 2 line, one red and one green.

The red line is the last file, and the green one is the original file.

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Maps / Edit / Injection (correction) overview

The Injection correction editor can be found by pressing this button.

Open											Firmware Version						
Tx	Rx	Sync	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit		

Within this environment you can define the corrections to the fuel maps against other inputs:

- Air temperature
- Water temperature
- Individual cylinders
- Airbox pressure

This environment also allows you to define the injection phase as a function of engine RPM.

Air Temperature Correction																
Interpolate	[°C]	-20.0	-16.8	-13.5	-10.3	-7.1	-3.9	-0.6	2.6	5.8	9.0	12.3	15.5	18.7	21.9	25
Interpolate	K	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

It can be applied to gain the injection of each of the temperature or pressure breakpoint. 1.000 Gain = no correction, gain, 0.000 shutdown of the vehicle at this value.

Phase																
RPM	900	1150	1800	2700	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500
[deg]	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180

Table for the definition of injection phase as a function of RPM – The angle is measured from Tooth 0 to the injection closing time. **FaseBase**.

Maps / Edit / Advance (correction) overview

The Advance correction editor can be found by pressing this button.

Open											Firmware Version						
Tx	Rx	Sync	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit		

Within this environment you can define the corrections to the advance maps against other inputs:

- Air temperature
- Water temperature
- Individual cylinders
- Airbox pressure

Air Temperature Correction																
Interpolate	[°C]	-20.0	-16.8	-13.5	-10.3	-7.1	-3.9	-0.6	2.6	5.8	9.0	12.3	15.5	18.7	21.9	25
Interpolate	[deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0

An offset in Deg can be applied to the advance at each of the individual temperature or pressure breakpoints.

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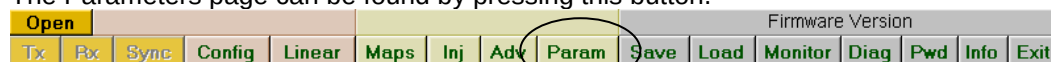
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Maps / Edit / Parameters / Overview

The Parameters page can be found by pressing this button.



Parameters page contains the following settings:

- Controls during ECU power on and engine start
- RPM limiters
- Pit limiter
- Launch control
- Overrun cut off
- Gear change calibration and set up
- Wheel speed calibration
- Fan Relay on/off control
- Injection and advance transient
- Traction control management

Mon226MV v1.1

Parameters (pag.1/3) Engine Calculations Mean RPM Filter Depth [Revs] 2 Acceleration Filter Depth [Revs] 8

Start & On/Off

Fuel-Pump Timer [ms]	2000	Engine Thresholds [rpm]	
Pre-Injection Delay [ms]	250	Upper (ON)	150
Drop-Switch Delay [ms]	1000	Lower (OFF)	100

Pre-Injection Time

[°C]	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0
[ms]	10.0	8.0	7.0	5.0	3.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Engine Limits [rpm]

Gear	Spark	Injection
1	13500	13600
2	13500	13600
3	13500	13600
4	13500	13600
5	13500	13600
6	13500	13600

Gear & Shift

Gear	Thresholds	TimeOuts [ms]	Shift Sequence
1	769	55	MinSpeed [rpm] 2000
2	638	55	Delay [ms] 5
3	513	55	HoldOff [ms] 300
4	385	55	
5	255	55	K-Injection 1.150
6	128	55	
Neutral		Sup. 1023	
Range		Inf. 870	

Cut-Off

Thresholds	Standard	Cyl. 1	Cyl. 2	Cyl. 3	Cyl. 4	
Speed [rpm]	7000	Advance Offset [deg]	0.0	0.0	0.0	0.0
Throttle [deg]	2.7	K-Injection	1.000	1.000	1.000	1.000
Throttle Variation [deg/s]	1200	Exit Time [ms]	0	0	0	0
Throttle Var. Filter Depth	1	Special	1^	2^	3^	4^
Special Exit Duration Count	0	Advance Offset [deg]	0.0	0.0	0.0	0.0
		K-Injection	1.000	1.000	1.000	1.000
		Exit Delay Count	0	0	0	0

Wheels

	Front	Rear
Circumference [mm]	1880	2048
Pulses	12	12

Fan Activation

[°C]	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	85.0	90.0	91.0	95.0	100.0	105.0	110.0
1=On	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

USB F4_312R_1000 F4_312R_1000 Firmware Version

Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

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Engine calculations

Acceleration Filter Depth [Revs] – number of motor revolutions which are calculated to obtain the value Acceleration (average)

Mean RPM Filter Depth [Revs] – number of motor revolutions which are calculated to obtain the value mean RPM (average)

Start & on/off

Fuel pump timer – value in Ms for the fuel pump to run at 'power on'

Drop switch delay time – Delay after the Drop-switch input is activated before the engine cut occurs, this is to ensure that small events less than this time do not interfere with normal operation.

Engine threshold – ON/OFF - RPM boundaries to define when the engine is running and when it has stopped. Always ensure that the Lower is less than the Upper and provide spacing between these parameters to create a hysteresis.

Pre injection time – At ECU power on all injectors are opened for a short period of time to prime the cylinders. The duration of this opening is defined within the **Pre-injection Time** table as a function of water temperature.

Engine speed limits

Values in RPM for each of the 6 possible gears. To create a softer cut the Injection value is usually a little lower than the Spark value.

For systems without a gear position sensor you should make all values in both columns the same. In this way, any fluctuation of the unconnected input will not affect your cut limit.

Wheels

These parameters are used to calibrate the front and rear wheels speeds. Enter the rolling circumference in mm and the number of trigger teeth for one wheel revolution.

Remember that this needs to be correct if you are planning to use wheel speed within your map corrections.

Relais activation

This output is used as low side switch to control an on off. The signal is at 0V when it is ON, and at 12V when is OFF. Depending on the settings that were selected for output configurations, you can create an on / off with a map as a function of water temperature or rpm.

Cut Off: The 'cut off' parameters are used for controlling advance and fuelling during engine 'over-run'.

To enable this strategy the engine must have a higher RPM than the **Speed** values and lower throttle value than the **Throttle** parameters.

When the strategy is active the correction settings for Advance as an 'additive' and Injection time as a Gain are applied to the map for each cylinder. Note that a gain of 0 to the injection time will cut the fuel completely.

It's possible to have different correction in function of different gear and also a different setting for each cylinder related with gear.

Cutoff stops to work after exit time param or when TPS movement is faster than throttle variation special exit value.

Gear & shift

The gear settings control both the calibration of the gear position sensor and the reaction of the ECU during gear change.

Different cells are available depending on the configuration settings (potentiometer only, engine/wheel ratio, standard, forced).

Note: It is assumed that the value of the potentiometer will increase with the gear number, if not you should change the wiring of the potentiometer.

Gear thresholds – Values in 10bit format of the potentiometer when the gear is fully inserted and recognised.

Min Speed – Minimum RPM for the gear shift sequence to activate.

Shift Delay – Delay in Ms for the strategy to activate following either a signal from the Load cell, the Switch input or the Shift threshold from the potentiometer.

Time out – The maximum time for the gear change process to complete in Ms.

Hold Off – To eliminate the possibility of a 'double switch' the time 'de-bounce' disables the strategy from re-occurring for 'x' Ms starting from the end of the previous occurrence.

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Advance – Spark advance value to be applied during gear change, this value replaces the main map.

K- Injection – Correction factor applied to the main Injection map for the duration of the gear change.

After TO revs – When the gear-shift strategy reaches the Time-Out limit, the end of the strategy is delayed by the number of engine revolutions given by this parameter.

Page 2/3 Transient

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Parameters (pag 2/3)

Advance Transient

	1 (lower)	2	3	4	5	6	7	8 (upper)
Time Base [ms]	5							
Filter Depth	1							
Noise Threshold [deg]	2.0							
Clipping [deg]	+ 7.0							
	- 5.0							

	1 (lower)	2	3	4	5	6	7	8 (upper)
Thresholds [deg]	2.0	4.0	6.0	9.0	16.0	30.0	43.0	60.0
Gain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Decay [deg/s]	800	800	800	800	800	800	800	800

	1 (lower)	2	3	4	5	6	7	8 (upper)
Thresholds [deg]	2.0	4.0	6.0	9.0	16.0	30.0	43.0	60.0
Gain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Decay [deg/s]	800	800	800	800	800	800	800	800

Coefficient by RPM

[rpm]	1000	1500	2000	2500	3000	3500	4000	4250	4500	4750	5000	5250	5500	5750	6000	6250	6500	6750
KA+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
KA-	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000

Injection Transient

	1 (lower)	2	3	4	5	6	7	8 (upper)
Time Base [ms]	5							
Filter Depth	1							
Noise Threshold [deg]	2.0							
Clipping [ms]	+ 5.000							
	- 5.000							

	1 (lower)	2	3	4	5	6	7	8 (upper)
Threshold [deg]	2.0	4.0	6.0	9.0	16.0	30.0	43.0	60.0
Gain	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Decay [deg/s]	800	800	800	800	800	800	800	800

	1 (lower)	2	3	4	5	6	7	8 (upper)
Threshold [deg]	2.0	4.0	6.0	9.0	16.0	30.0	43.0	60.0
Gain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Decay [deg/s]	800	800	800	800	800	800	800	800

Coefficient by RPM

[rpm]	900	1150	1800	2700	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500
KJ+	1.400	1.400	1.400	1.400	1.400	1.200	0.950	0.950	0.950	0.950	0.950	0.900	0.950	0.950	0.950	0.950	0.950	0.950
KJ-	-1.400	-1.400	-1.400	-1.400	-1.400	-1.200	-1.200	-1.200	-1.200	-1.100	-1.100	-1.100	-1.050	-1.050	-1.050	-1.050	-1.050	-1.050

Coefficient by Water Temperature

[°C]	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0
KJ+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
KJ-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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For transient strategy details see the separated manuals.

Injection transient

The Injection transient is defined by a series of parameters.

Time base Ms. – Time period over which the input change is considered.

Filter depth – Number of samples over which the filter is calculated.

Noise threshold – Value in throttle deg / mBar variation within which the transients are not considered. This is used to eliminate small fluctuations in throttle / Air pressure stability.

The choice of **mBar** or **Throttle** is defined with the Configuration page

Clipping – Maximum (+) and Minimum (-) value in mSec injector duration that are permitted as a result of the transient strategy.

To enable differing transient values at different throttle values / Air pressures, 8 breakpoints for may be defined in the upper row.

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Within these boundaries the rate of change of Throttle / Air pressure is monitored as for previous settings and a positive **Gain** is applied to suit your needs. This output is known as the **Injection time transient** and will be a value either Positive or Negative depending whether the throttle was opening or closing. For all of the Positive transient states the upper set of values will be applied.

Decay (deg/ms) – Maximum transient decay (decreases for positive values) allowed in a single time interval (as defined by the Time Base). This applies starting from the time the transients begins to decrease until it returns to 0. The effect is to limit the speed of the transient's decay (return to normal)

Similar settings are applied when the throttle / Air pressure is reducing.

The injection time transient can be further modified by applying Gains as a function of different RPMs **DJDInTrpm** as shown in this table below.

Injection Coefficient by RPM																
Interpolate	[rpm]	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	8000
Interpolate	KJ+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Interpolate	KJ-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Injection Coefficient by Water Temperature																
Interpolate	[°C]	-10.0	-5.2	-0.3	4.5	9.4	14.2	19.0	23.9	28.7	33.5	38.4	43.2	48.1	52.9	62.6
Interpolate	KJ+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Interpolate	KJ-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

It may also be adjusted by applying gains as a function of water temperature - **DJDInTh2o**

Advance transient

The advance transient is defined by a series of parameters.

Time base Ms. – Time period over which the input change is considered.

Filter depth – Number of samples over which the filter is calculated.

Noise threshold – Value in throttle deg variation within which the transients are not considered. This is used to eliminate small fluctuations in throttle stability.

Clipping – Maximum (+) and Minimum (-) value in Degrees of spark advance that are permitted as a result of the transient strategy.

To enable differing transient values at different throttle values, 8 breakpoints for throttle may be defined in the upper row.

Within these throttle boundaries the rate of change of throttle is monitored as for previous settings and a positive **Gain** is applied to suit your needs. This output is known as the **Throttle Advance transient** and will be a value either Positive or Negative depending whether the throttle was opening or closing. For all of the Positive transient states the upper set of values will be applied.

Decay (deg/ms) – Maximum transient decay (decreases for positive values) allowed in a single time interval (as defined by the time base). This applies starting from the time the transients begins to decrease until it returns to 0. The effect is to limit the speed of the transient's decay (return to normal)

Similar settings are applied when the throttle is closing.

The throttle advance transient can be further modified by applying Gains as a function of different RPMs **DADInT** as shown in this table below.

Coefficient by RPM																
Interpolate	[rpm]	1000	1500	2000	2500	3000	3500	4000	4250	4500	4750	5000	5250	5500	5750	6000
Interpolate	KA+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Interpolate	KA-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

The KA+ is used to modify positive (increasing) throttle transients and the KA- is used to modify negative (reducing) throttle transients.

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Parameters (pag.3/3)

Speed Limiter

Type	Limits [km/h]		Maximal Corrections	
Front Wheel	Inf.	60	K-Injection	0.500
	Sup.	60	Advance [deg]	-30.0

Launch Control

Enable Mode: Front Wheel

Speed Threshold [km/h]: 80

Activation Limits [rpm]	Inf.	Sup.	Settings	
Injection	6000	6500	K	1.200
Advance	6000	6500	[deg]	35.0

Traction Control Adjust

Level	1	2	3	4	5	6	7	8
% Inj	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
%Adv	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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For launch control and speed limiter details see the separated manuals.

-extra information-

Launch control

Pin for enable the strategy #02 connector 8 pole that needs to be connect at GND.

Speed limiter

Pin for enable the strategy #01 connector 8 pole that needs to be connect at GND

Traction control

Set 8 different % correction applied to the acceleration correction map. 100% means same correction as written in the maps. 50% means half correction.

This 8 levels can be switched from the dashboard or an external PAD.

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Special gear strategy

Inserted gear recognition – Each of the 6 gears corresponds to a fixed zone in the 10bit A/D-range of the gear-position potentiometer. A gear is considered completely inserted when the gear-position is within the corresponding zone. We call these zones the “inserted gear recognition intervals”, or simply “gear intervals”. These intervals are centred on the “**gear thresholds**” and their tolerance is given by “**delta**”.

The lower limit of a gear interval is the point where the corresponding gear gets “completely inserted” and is thus called “complete gear insertion threshold”.

IMPORTANT - you should set all values in order to avoid overlapping intervals

Start of gear change – A gear-shift sequence starts when the leading edge of the “set” signal is detected.

In case of standard strategy (“All Inputs”) the “set” signal is given by the gear-shift input OR with the load cell signal.

When the alternate strategy is selected (“Potentiometer Only”) the “set” signal is initiated when the gear position reaches the **Shift Threshold**. This simulated “set” signal is deactivated when the gear position reaches the “complete insertion threshold” of the next gear.

The “set” is recognized and is initiated only after the time given by the **Delay** parameter has elapsed, starting from the leading edge of the signal.

Recognition of subsequent set signals is inhibited under the following circumstances:

- When a gear change sequence is already in progress.
- During a time-interval given by the **HoldOff** parameter starting from the end of the completion of the gear change.
- If the 6th gear is inserted.
- If the engine speed is below the limit given by the **MinSpeed** parameter.

Gear change strategy – A gear change sequence is composed by a maximum of 4 phases.

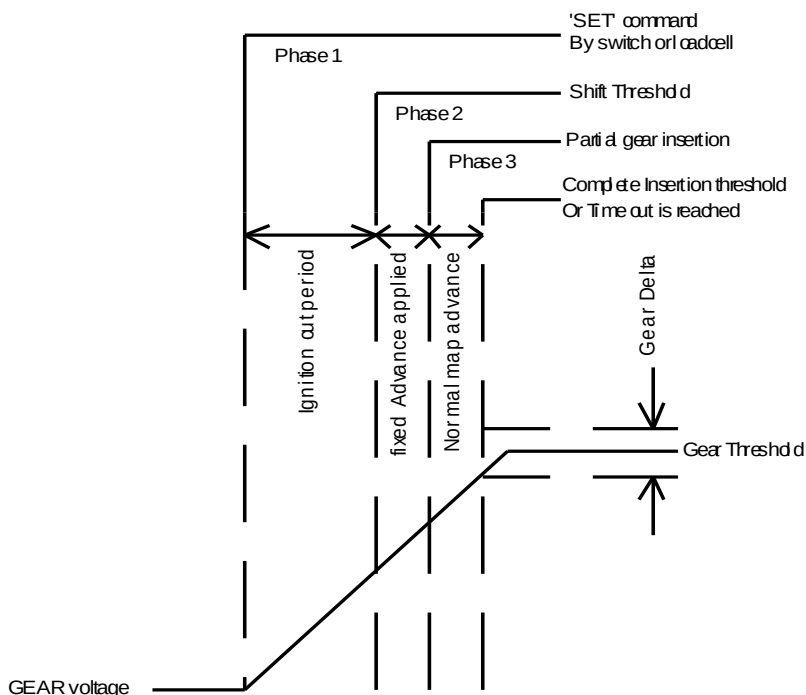
Phase 1 – Starting when a “set” command and ending when the gear position reaches the “**shift threshold**”. During this phase ignition is inhibited (“Cut-Off” phase).

Phase 2 – Starting when the gear position reaches the “shift threshold” and ends on the “partial gear insertion threshold”, which is calculated as the arithmetic mean of the “shift threshold” and the “complete insertion threshold” of the next gear. In this phase ignition is reactivated, but with fixed advance given by the **Advance** parameter

Phase 3 - Starting on the “partial gear insertion threshold” and ends on the “complete insertion threshold”, or when the time-out limit is reached. In this phase ignition occurs normally, with advance coming from map interpolations and all the various corrections.

Phase 4 - It starts when the Time-Out limit is reached (only if the gear still isn't completely inserted) and ends after a number of engine revolutions given by the **AfterTO** parameter (“After Time-Out” phase), or when the gear position reaches the “complete insertion threshold”. During this phase ignition is again inhibited.

During all 4 phases (that is during the whole gear change sequence) fuel injection is corrected by a gain given by the **K-Injection** parameter.



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Example of shift strategy with a gear sensor and 'Set' initiated from switch or load-cell

Note: Example presumes that the gear sensor will start to move at the exact same moment as the Set command

Special cases - With proper setting of parameter values, you can force a gear change sequence without some of the phases explained above.

1 - Gear change with Cut-off only.

You can avoid phase 2 and 3 completely by setting the **Shift**

Thresholds greater than or equal to the **Complete Insertion Thresholds** of the next gear (the simplest way is to set them to 1023, that is the maximum A/D-value). If the **AfterTO** is greater than 0, the fourth phase is also applied as an extension of the cut-off phase. In this mode the Cut Off period will be equal to the **Time Out setting**

2 - Gear change without cut-off.

To avoid the occurrence of the phase 1, you have to set the **shift thresholds** less than the **Complete insertion Thresholds** of the next gear (simply set them to 0). Doing so the **Partial Insertion Thresholds** are ignored by the strategy.

3 - Gear change without After Time-Out phase.

Simply set the **AfterTO** parameter to 0.

4 - Gear change with forced time-out.

To force the sequence to reach the time-out limit (without ending on the complete insertion threshold) you have to set the **Delta** parameter to 0. Doing so the strategy also ignores the shift thresholds and the partial insertion thresholds. This setting is needed when using a selector instead of a potentiometer as the gear position sensor (in this case there is no guarantee as for the AD-value during the gear change sequence)

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Monitor / Overview

Open	_default				_default				Firmware Version						
Tx	Rx	Sync	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit

The Monitor page can be accessed by pressing this button on the lower tool bar. This page is used for the following purposes.

- Real time monitoring of input / outputs / Internal calculated values
- Warning signals
- Manual control over injectors / coils / pump
- Manual temporary trims
- Read back of the map names stored in the ECU.

Remember that you must have an Open – CAN link to see this data.

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Engine		Cyl. 1 Cyl. 2 Cyl. 3 Cyl. 4				Digital Inputs		Manual Adjusts						
RPM	0					Code Load		KJbnc	0.000					
Acceleration	0	Terog	0.000	0.000	0.000	Scam Hall	Pcam	KJbnc 1	0.000					
Revolutions	0	Phase	0.0	0.0	0.0	Stop		KJbnc 2	0.000					
Scam	0 err 0	Advance	0.0	0.0	0.0	Drop Switch		KJbnc 3	0.000					
Smot	0 err 0	Dwell	0.000	0.000	0.000	Shift Set		KJbnc 4	0.000					
Injection Spark Cranking		Advance Components				Start Neutral		KFbnc	0					
Cut-Off Pit-Lane Launch		TetaBase	0.0	KAGear	0.0	Launch Clutch		KAbnc	0.0					
OverDwell		KATH20	0.0	KAVel	0.0	Pit Limiter		KAbnc 1	0.0					
Injection		KATAir	0.0	KAAcc	0.0	Sidestand		KAbnc 2	0.0					
OverTime		KAPair	0.0	DADInT	0.0			KAbnc 3	0.0					
Exhaust Valve	0.0	KAAux	0.0	DAPickUp	0.0	Wheels Front Rear		KAbnc 4	0.0					
EBS Valve	0.0					Velocity	0 0	Exh. Valve	0.0					
TSS Valve	0.0					Space	0 0	EBS Valve	0.0					
Analog Inputs		Injection Components				Injection Phase		Outputs						
Throttle	0.0 0	TerogBase	0.000	0.000	0.000	FaseBase	0	Start Relay	Trigger 1 Injector 1					
Gear	1 0 0	KJAux	0.000	0.000	0.000	232		Fuel Pump	Trigger 2 Injector 2					
Water Temp.	0.0 0	KJTH20	0.000	DJDInTrpm	0.000	Gear		Fan Relay	Trigger 3 Injector 3					
Air Temp.	0.0 0	KJTAir	0.000	DJDInTh2o	0.000	Set		Light Relay	Trigger 4 Injector 4					
Air Pressure	0 0	KJPair	0.000	DJDInT	0.000	Shift		Traction Control Adjustment Level 0						
Lambda	0.0	KJCrank	0.000			Hold-Off								
Exhaust Valve	0.0 0	KJGear	0.000			Time-Out								
Map-Select	1 0	KJVel	0.000			Cut-Off								
Battery	0.0 0	KJAcc	0.000	OffsVbat	0.000	Advance								
Adv. Transient	0.0 Throttle	Mapping Data 1												
Inj. Transient	0.0 Throttle	Mapping Data 2												
		Configuration Parameters												
USB	F4_312R_1000	F4_312R_1000				Firmware Version								
Open	Tx Rx	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit

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Engine

RPM – Real time read out of the engine speed. The larger green LED to the left only illuminates when the crank/(cam) pattern is recognised and considered by the ECU to be correct. The smaller LED turns red if the drop switch or kill switch inputs are active.

Revolutions – Total number of engine revolutions since the engine started, each time the motor stops/starts this count is reset.

Scam / err – Total number of signals seen from the cam sensor with an error count of the number of signals that are considered to be out of sequence. Count is re-set at engine stop/start

Smot / err – (Smot = Speed Motor) Total number of signals seen from the crank sensor with an error count of the number of signals that are considered to be out of sequence. Count is re-set at engine stop/start.

Injection – This LED is activated when the fuel injectors are in operation.

Cranking – This LED is activated during the cranking phase of the engine start.

Spark – This LED is activated when the ignition coils are in operation.

Pit lim – this LED is activated when the pit lane limiter is on

Launch control – this LED is activated when the launch control strategy is on

Cut Off – This LED is activated when the engine is in 'Cut Off' state

Over Dwell – One or more of these LEDs will illuminate if the ignition coil charge time is too long. Number equates to the cylinder number.

Injection over time - One or more of these LEDs will illuminate if the injection time is too long. The upper row is for high bank injectors, the lower row for the primary bank. Number equates to the cylinder number.

Wheels

Values of the front and rear wheel **Velocity** in Kmh and the **Space** (distance) in meters since the last time the Space was re-set using the Space Re-Set command in the **Diag** page.

Digital input and output

These LEDs identify the status of inputs and digital outputs

Dark green = input / output off

Green = input / output active

Loaded file

Mapping 1 - name of the file saved in slot number 1 (in dark grey because the map is on)

Mapping 2 - name of the file saved in slot number 2

Configuration - the name of the file saved in the slot configurations.

These are the file names of the unit does not present on the PC.

Command PWM Exhaust valve EBS and TSS

This window allows you to see in real time the status of various PWM outputs.

The reading is expressed as a percentage%.

Gear

This section highlights the different activations of the gear change.

Starting from the set to turn on the strategy until the end with time out

Transient

Small section that display the values of transient signal and its reference to the maps.

Window display cylinder to cylinder of all are the final injection, advance, phase and time charging coil in real time.

	Cyl.1	Cyl.2	Cyl.3	Cyl.4
Terog	0.000	0.000	0.000	0.000
Phase	0.0	0.0	0.0	0.0
Advance	0.0	0.0	0.0	0.0
Dwell	0.000	0.000	0.000	0.000

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Output test

These buttons are used to manually activate the trigger output and the injectors in order to test the electrical circuit. These manual tests must be done before starting the engine for the first time to ensure proper function. Some buttons are not highlighted for use. This depends on the configuration of the system.

Outputs			
Start Relay	Trigger 1	Injector 1	
Fuel Pump	Trigger 2	Injector 2	
Fan Relay	Trigger 3	Injector 3	
Light Relay	Trigger 4	Injector 4	

Advance components

This section is dedicated to the values and the corrections that make up the advance. All values are expressed in degrees.

Injection components

This section is dedicated to the values and the corrections that make the injection. All values are multiplying.

Manual corrections

This section allows you to make real time changes. These changes are not stored in the map.

KJ= injection correction
KA= advance correction

Analogic signal

See all current information on analog inputs. In dark boxes appear in the count values of converters A / D channels of different input and clear the boxes containing the value obtained through linearization. For some inputs there is a third indication.

About gear position, when red led is on, there is neutral gear active.

Manual Adjusts			
KJbnc			0.000
KJbnc 1			0.000
KJbnc 2			0.000
KJbnc 3			0.000
KJbnc 4			0.000
KFbnc			0
KAbnc			0.0
KAbnc 1			0.0
KAbnc 2			0.0
KAbnc 3			0.0
KAbnc 4			0.0
Exh. Valve			0.0
EBS Valve			0.0
TSS Valve			0.0

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Via Avris 3 – 21032 CARAVATE (VA) ITALY – C.F. – P.IVA 02356120127 – Reg. Imprese 24798/1997 VA
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Diag / Overview

Open			_default			_default			Firmware Version						
Tx	Rx	Sync	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit

The Diagnostic button can be accessed by pressing this button on the lower toolbar. Within this environment you have the following options:

- Reset of stored errors
- Definition of 'correct working' parameters

Mon226MV v1.1

Diagnostics

Engine	Count		RPM-Thr.
RPM Errors	0	Reset	0
Smot Errors	0	Reset	0
Scam Errors	0	Reset	0
ON-time [min]	0	Reset	

Over-Dwell	Count	
Trig 1	0	Reset
Trig 2	0	Reset
Trig 3	0	Reset
Trig 4	0	Reset

Over-Time	Count	
Inj 1	0	Reset
Inj 2	0	Reset
Inj 3	0	Reset
Inj 4	0	Reset

Set Parameters
All to Default

Reset All

☐ Reset All
at Power-On

Wheels	Count		Vel. Thr.
Front Errors	0	Reset	0
Rear Errors	0	Reset	0

Inputs	Count	
Code Load	0	Reset
Scam Hall	0	Reset
Stop	0	Reset
Drop Switch	0	Reset
Shift Set	0	Reset
Neutral	0	Reset
Start	0	Reset
Pit Limiter	0	Reset
Clutch	0	Reset
Sidestand	0	Reset
Launch	0	Reset

Analog	Total Errors		On	Max. Consec. Errors	Min. Value	Max. Value	Recovery Value	
Throttle	0	Reset		0	0	0.0	0	0.0
Gear Position	0	Reset		0	0	0	0	0
Water Temp.	0	Reset		0	0	0.0	0	0.0
Air Temp.	0	Reset		0	0	0.0	0	0.0
Air Pressure	0	Reset		0	0	0	0	0
Lambda	0	Reset		0	0	0.0	0	0.0
Valve	0	Reset		0	0	0.0	0	0.0
Map-Select	0	Reset		0	0	0	0	0
Battery	0	Reset		0	0	0.0	0	0.0

USB	F4_312R_1000		F4_312R_1000		Firmware Version										
Open	Tx	Rx	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit

The errors seen here do not need to occur when the ECU and PC are connected, whenever an error occurs, a count of the events are stored in memory 'EEPROM' and re-called when this page is accessed. They are only re-set at your command.

You have the option here to Reset All diagnostic counts manually by pressing the button "reset All", or by applying a tick within the box you can re-set the counters every time you power on. "set parameters all to default"

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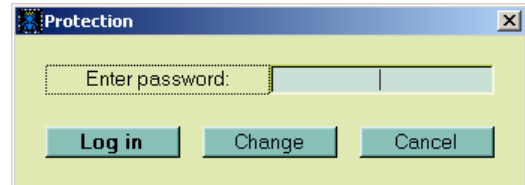
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Diag / Password



The password is a means of protecting your maps and configurations from other subsequent users of the ECU. When the protection is active it is not possible to transmit or receive either the configuration or mapping data between ECU and PC, map-tuning is also inhibited.

All internally calculated values related to engine control for ignition and injection plus some others are hidden, and the protection state of the ECU is signalled by the text colour in the **Open/Close** push-button (red = protected; green = unprotected; black = not connected).



Pressing the **PWD** button opens the Protection dialog-box. You can enter a password at any time, even when the connection between ECU and monitor is not active. After typing the password press the **Log in** button to confirm it. When the connection to an ECU is established, the password is repeatedly sent to the ECU which evaluates if it is correct by comparing it with the copy stored in memory, the protection state is set accordingly.

You can modify the internally stored password when connection is active. In this case, after entering the new password, you have to press the **Change** button, then re-enter the password and press the **Confirm** button.
IMPORTANT -Be aware that changing the ECU's internal password will erase all configuration and mapping data (after a final confirmation by the user)

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Connettori E/V	Segnale M226	Funzione IAW 5SM B5
12V	VBAT	Ingresso switch chiave quadro
7E-35E-36E-15V-46V	SGND	Massa analogica
51V	CAN1_H	Linea CAN H (high speed)
20V	CAN1_L	Linea CAN L (high speed)
5E	PGND	Massa potenza
21E	PGND	Massa potenza
17E	COIL1	Uscita comando bobina 1
19E	COIL2	Uscita comando bobina 2
3E	COIL3	Uscita comando bobina 3
1E	COIL4	Uscita comando bobina 4
50E	INJ1	Uscita comando Iniettore 1
34E	INJ2	Uscita comando Iniettore 2
49E	INJ3	Uscita comando Iniettore 3
33E	INJ4	Uscita comando Iniettore 4
58V	WARNING LAMP	Uscita comando "Warning Lamp"
51E	SEC VALVE	Uscita comando valvola "Aria Secondaria"
13V	REP_START	Uscita ripetizione Ingresso "start engine"
57E	MOTVALVE+	Uscita comando +DCM valvola allo scarico
52E	MOTVALVE-	Uscita comando -DCM valvola allo scarico
64V	LIGHT_RELAY	Uscita comando relé luci
11E	TSS VALVE	Uscita comando valvola TSS
62V	FUEL_PUMP	Uscita comando relé carichi
55V	FAN_RELAY	Uscita comando relé elettroventola
32E	HEATER	Uscita comando PWM riscaldatore 1
2E	START_RELAY	Uscita comando teleruttore avviamento
7V	P_OIL	Ingresso sensore pressione olio
45V	EBS VALVE	Uscita comando valvola EBS
9E	PICKUP	Ingresso sensore giri (+)
10V	SHIFT	Linea seriale K
26V	STOP	Ingresso switch "Engine Stop"
14V	START	Ingresso switch "Start Engine"
60V	FOLLE	Ingresso sensore folle
24E	SCAM_HALL	Ingresso sensore fase motore
29V	VBAT	Ingresso switch chiave quadro
23E	SGND	Massa analogica
6E	PGND	Massa potenza
22E	PGND	Massa potenza
15E-2V	+VREF1	Vref1 +5V sensore farfalla
13E-3V	+VREF2	Vref1 +5V sensore feedback DC motor
44E	THROTTLE	Ingresso potenziometro farfalla
30E	POTVALVE	Ingresso FB DCM valvola allo scarico
50V	CLUTCH	Ingresso sensore frizione
63E	AIR_TEMP	Ingresso sensore temperatura aria
45E	H2O_TEMP	Ingresso sensore temperatura acqua
31E	P_BARO	Ingresso sensore pressione aria
6V	SIDESTAND	Ingresso switch stampella laterale
49V	VEL_ANT	Ingresso velocità veicolo
19V	DROP_SW	Ingresso sensore ribaltamento
63V	TACHO	Uscita comando conta giri



Contact view
Vista lato contatti

CN6	Segnale AUX M226
1	PIT_LIMITER
2	LAUNCH
3	CODELOAD
4	VEL_POS
5	MAP_SELECT
6	GEAR_POS
7	CAN2_H
8	CAN2_L
9	VBAT
10	+VREF1
11	PGND
12	PGND

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CAN frame details

Special data from CanKeypad:

ID set by software.

used byte: 4.

byte 0: 3C

byte 1: D5

byte 2: none

byte 3: none

byte 4: control

byte 5: none

byte 6: none

byte 7: none

byte 4 details:

U8 tcaLevel:4; TCA enable and level selection

U8 tcaInc :1; TCA level increment request

U8 tcaDec :1; TCA level decrement request

U8 :2;

- tcaLevel: can be from 0 to 8.

0 disable TC, values from 1 to 8 set TC level.

- tcaInc: TRUE for increase TC level.

- tcaDec: TRUE for decrease TC level.

*Warning: tcaInc and tcaDec have priority than tcaLevel and they can't be true at the same moment.
if I set TRUE, tcaInc or tcaDec, tcaLevel can be null even without being disabled.*

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